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10/616,588	07/09/2003	Taehyun Jeon	3364P118	1286

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EXAMINER	
VLAHOS, SOPHIA	
ART UNIT	**PAPER NUMBER**
2611	

DATE MAILED: 09/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/616,588	JEON ET AL.	
	Examiner	Art Unit	
	SOPHIA VLAHOS	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 6-11* is/are rejected.

7)☒ Claim(s) *4 and 5* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/9/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority (KOREA 2002-77999 filing date 12/09/2002) under 35 U.S.C. 119(a)-(d).

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "...loop filter; and enabling the signal that has passed through the loop filter to pass through a digital voltage control oscillator..." mentioned in claim 6,must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must

be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claim 5 is objected to because of the following informality:

In the equation shown in claim 5, the following should be defined $\hat{\alpha}_i$ $\varphi_{i,j}$ and $\varphi'_{i,j}$.

Appropriate correction is required.

4. Claims 2 and 3 are objected because of the following informalities: Both claims recite: "wherein (a) and (b) comprise..." where (a) and (b) refer to steps in claim 1 and should be spelled out in claims 2 and 3.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Ghosh (U.S. 5,802,117).

With respect to claim 1, Ghosh discloses: (a) detecting data received from the transmitter by using a first signal (see Fig. 1, where the first signal is the received signal after guard removal), and tracking a phase offset caused by the carrier frequency offset by using the detected received data (Fig. 1, element 15, "frequency offset & timing estimation", column 5, lines 46-47); (b) detecting the data received from the transmitter by using the first signal (see Fig. 1, after the removal of the guard, S1 and S2 are used in element 15, column 6, lines 58-61), and tracking the phase offset caused by the sampling frequency offset by using the detected received data (see Fig. 2 , S1 and S2 are part of the received data frame, see Fig. 1, outputs $\hat{\varepsilon}$ and $\frac{\Delta\hat{T}}{T}$ the frequency offset and timing offset respectively that cause phase offsets see vectors for symbols shown in equations (18)-(23) where $\hat{\varepsilon}$ and $\frac{\Delta\hat{T}}{T}$ cause phase shifting of the symbols R_1 and R_2, see column 7,lines 66-67, column 8, line 1); (c) compensating for the phase offset caused by the carrier frequency offset between the transmitter and the receiver according to the phase offset tracked in (a) (see Fig. 1, output $\hat{\varepsilon}$ of element 15 and output of "frequency control" element 18 into multiplier 19, see column 5, lines 54-56) ; and (d) compensating for the phase offset caused by the sampling frequency offset between the transmitter and the receiver according to

the phase offset tracked in (b) (see Fig. 1 output $\frac{\Delta \hat{T}}{T}$ of element 15 into element 16, "timing control", column 5, lines 56-57).

With respect to claim 11, claim 11 is analyzed similarly to claim 1 above.

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

8. Claims 1, 7 11 are rejected under 35 U.S.C. 102(a) as being anticipated by De Courville et. al., (U.S. 6, 198,782).

With respect to claim 1, De Courville et. al., disclose: (a) detecting data received from the transmitter by using a first signal (see Fig. 4, output $Y_m(k)$ out of element 14, "Remove Channel"), and tracking a phase offset caused by the carrier frequency offset by using the detected received data (see Fig. 4, $Z_m(k)$ into element 16 "Compute estimates" $\hat{\varepsilon}$ and $\hat{f}$ the carrier and clock frequency offsets causing (phase) rotation, see column 2, lines 28-38 and lines 58-60) ; (b) detecting the data received from the transmitter by using the first signal, and tracking the phase offset caused by the sampling frequency offset by using the detected received data (Fig. 4, element 16, column 2, lines 55-67); (c) compensating for the phase offset caused by the carrier frequency offset

between the transmitter and the receiver according to the phase offset tracked in (a) (column 2, lines 63-65); and (d) compensating for the phase offset caused by the sampling frequency offset between the transmitter and the receiver according to the phase offset tracked in (b) (column 2, lines 60-63).

With respect to claim 11, claim 11 is analyzed similarly to claim 1 above.

With respect to claim 7, all of the limitations of claim 7, are analyzed above in claim 1 above, and De Courville et. al., disclose: wherein the first signal has passed through a frequency domain equalizer (see Fig. 4, output $Y_m(k)$ out of element 14, "Remove Channel" is the first signal and is equalized (see column 5, lines 5-6), clearly in the frequency domain since the input to element 14 is an output of a fourier transform (DFT) operation).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Courville et. al., (U.S. 6,198,782).

With respect to claim 8, De Courville discloses: an analog/digital converter for converting a signal received by the receiver into a digital signal (Fig. 4, see element 10, "A/D Converter"); a guard interval remover for removing a guard interval from the converted digital signal (Fig. 4, element 12, "Guard Interval Removal"); an DFT (discrete Fourier transform) unit for transforming the guard-interval-removed signal into a signal in a frequency domain (Fig.4, element 13, "DFT demodulator", column 2, lines 28-32); an FEQ (frequency domain equalizer) for recovering a signal distorted by a communication channel from the converted signal in the frequency domain (Fig. 4, element 14, "Remove Channel" column 5, lines 5-6); and an offset tracker/compensator for tracking a phase offset caused by the carrier frequency offset and the sampling frequency offset and compensating for the same by using the signal received from the FEQ (see Fig. 4, element 16, "compute estimates", column 2, lines 58-67).

De Courville does not expressly teach: an FFT (fast Fourier transform) unit for transforming the guard-interval-removed signal into a signal in a frequency domain (De Courville teaches a DFT instead of FFT). However, at the time of the invention, it would have been obvious to a person of ordinary skill in the art that the DFT of De Courville functions equivalently to an FFT (DFT can be replaced by an FFT or vice versa).

With respect to claim 9, all of the limitations of claim 9 are analyzed above in claim 8 (also see column 2, lines 28-41, where Rm(k) is representative of the transmitted S(k)).

11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over De Courville et. al., (U.S. 6,198,782) as applied to claim 1, and in view of Bingham (U.S. 5,228,062).

With respect to claim 6, all of the limitations of claim 6 are analyzed above in claim 1, and De Courville discloses: enabling the signal to pass through a voltage control oscillator, and applying the signal for compensation of the phase offset of the signal received at the next symbol interval (see column 2, lines 64-65, see column 7, lines 22-24 consecutive symbols are used for the estimation which means that the next received symbol is compensated). De Courville does not expressly teach a digital voltage control oscillator, however at the time of the invention, it would have been obvious to a person of ordinary skill in the art to implement the voltage control oscillator as a digital voltage control oscillator that can be integrated with other components in a chip.

With respect to the limitation: removing unnecessary noise of a frequency band by enabling the tracked phase offset to pass through a loop filter. In the same field of endeavor, Bingham (U.S. 5,228,062) discloses: enabling the tracked phase offset to pass through a loop filter (see Fig. 2, LPF 170 receiving Δf the carrier offset, see column 5, lines 46-47, column 6, lines 48-49, where it is understood that the frequency response of a low-pass filter passes a specific (the wanted) frequency band).

12. Claims 2, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Courville et. al., (U.S. 6,198,782) as applied to claims 1, 9 and in view of Matheus et. al., (U.S. 7,009,932).

With respect to claim 2, all of the limitations of claim 2 are analyzed above in claim 1, except for: wherein (a) and (b) comprise tracking the phase offset in consideration of a gain value of each subchannel on which a pilot signal is located.

In the same field of endeavor, Matheus et. al., disclose tracking the phase offset (see combination of Fig. 1, Fig. 2) in consideration of a gain value of each subchannel on which a pilot signal is located (see Fig.1, element 12 "channel estimation" generates Cest,n (i) coefficients used in FTD (frequency tracking device) Fig. 2, se also column 5, lines 50-62, where it is understood that the channel coefficients correct the effects of the dispersive channel (i.e. gain and/or phase shifts)). At the time of the invention, it would have been obvious to a person of ordinary skill in the art that element 14 "remove channel" of De Courville et. al., can use the channel coefficients (understood to compensate for the gain and/or phase shifts distortions cause by the channel) as taught by Matheus et. al. so that compesation for all the subcarriers of the OFDM symbols can be obtained.

With respect to claim 10, all of the limitations of claim 10 are analyzed above in claim 9, and claim 10 is analyzed similarly to claim 2 above.

13. Claims 1-3, 6, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bingham (U.S. 5,228,062) in view of De Courville et. al., (U.S. 6,198,782).

With respect to claim 1, Bingham discloses: (a) detecting data received from the transmitter by using a first signal (see Fig. 2, signal out of the "demodulator" element 120 is considered to be the first signal), and tracking a the carrier frequency offset by using the detected received data (see Fig. 2, signal output of element 130 "decode", column 3, lines 45-53 decoded data used to determine the residual carrier frequency offset); (b) detecting the data received from the transmitter by using the first signal, and tracking the sampling frequency offset by using the detected received data (Fig.2, signal out of "decoder", column 3, lines 45-53, residual clock frequency offset) ; (c) compensating for the offset caused by the carrier frequency offset between the transmitter and the receiver (a) (column 3, lines 48-53); and (d) compensating for the offset caused by the sampling frequency offset between the transmitter and the receiver (b) (see column 3, lines 48-53).

Bingham does not expressly teach: tracking a phase offset caused by the carrier frequency offset; tracking the phase offset caused by the sampling frequency offset. (Bingham does not mention phase offsets). However, in the same field of endeavor, De Courville et. al., disclose: tracking phase offsets (rotations) caused by the carrier frequency offset; tracking the phase offset (rotations) caused by the sampling frequency offset (see column 2, lines 58-60). At the time of the invention, it would be obvious to a person of ordinary skill in the

art that the the sampling frequency and clock frequency offsets in the multicarrier system (for example OFDM) of Bingham exhibit themselves as phase offsets (rotations) in the received signals. Therefore, tracking the carrier frequency offset; and tracking the sampling frequency offset would involve tracking respective phase offsets.

With respect to claim 2, all of the limitations of claim 2 are analyzed above in claim 1, and Bingham discloses: wherein (a) and (b) comprise tracking the phase offset in consideration of a gain value of each subchannel on which a pilot signal is located (see column 4, lines 66-67 two pilot tones in the 1000 and 2000 subchannels, column 3, lines 10-16, and with respect to considering a gain value of each subcahnnel on which a pilot signal is located, this is interpreted as the referring to any degradation (negative gain) caused by the channel on the transmitted pilot tones).

With respect to claim 3, all of the limitations of claim 3 are analyzed above in claim 2, except for: wherein (a) and (b) comprise comparing a Euclidean distance between the first signal and theoretical signals, and detecting the received data by using the theoretical value that corresponds to the nearest distance. Official Notice is taken that a Viterbi decoder (that compares a Euclidean distance between the first signal and theoretical signals, and detecting the received data by using the theoretical value that corresponds to the nearest distance) is extremely well known in the art and commonly used, therefore it

would have been obvious to a person of ordinary skill in the art to implement the "decoder" element 130 shown in Fig. 2 of Bingham as a Viterbi decoder has a fixed decoding time and its size does not depend on the complexity of the received signals.

With respect to claim 6, all of the limitations of claim 6 are analyzed above in claim 1, and Bingham discloses: wherein (c) comprises: removing unnecessary noise of a frequency band by enabling the tracked phase offset to pass through a loop filter; and enabling the signal that has passed through the loop filter to pass through a voltage control oscillator, and applying the signal for compensation of the phase offset of the signal received at the next symbol interval (see Fig. 2, filters 180, 170, understood to be designed to eliminate unwanted frequency bands, see Fig. 2, output of filter 180 entering VCO 300, controlling a sampler 10 that is understood to sample during symbol intervals). Bingham does not expressly teach: a digital voltage control oscillator. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to implement the voltage control oscillator as a digital voltage control oscillator that can be integrated with other components in a chip.

With respect to claim 11, claim 11 is analyzed similarly to claim 1 above.

Allowable Subject Matter

14. Claims 4-5 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Joshi et. al., (U.S. 2002/0064240) discloses a method of compensating for carrier frequency and phase errors using data tones as training tones.

Seki et. al., (U.S. 5,602,835) disclose: an OFDM system that corrects for sampling time and carrier frequency offset.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SOPHIA VLAHOS whose telephone number is 571 272 5507. The examiner can normally be reached on MTWRF 8:30-17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 571 272 3021.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

9/12/2006
SV

MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER